In the Claims

Claims 21-42 (canceled)

43. (New) An immature hyaline cartilage (neo-cartilage) construct suitable for implantation into a cartilage lesion, said construct comprising a support matrix seeded with isolated chondrocytes that, when subjected to a treatment regimen, are activated to synthesize a new extracellular matrix within said support matrix, wherein a ratio of the newly synthesized extracellular matrix to activated chondrocytes is lower than a ratio of extracellular matrix to inactive chondrocytes in a mature hyaline cartilage;

wherein said chondrocytes of the neo-cartilage construct are previously inactive and non-dividing chondrocytes isolated from a donor joint cartilage;

wherein said cartilage is subjected to enzymatic digestion to further isolate said chondrocytes from the extracellular matrix and glycosaminoglycans;

wherein said isolated chondrocytes are expanded into a dividing chondrocytes by culturing said chondrocytes in a medium containing serum;

wherein said expanded chondrocytes are suspended in a suspension solution and seeded within said support matrix;

wherein said seeded chondrocytes are metabolically activated to synthesize the new extracellular matrix within said support matrix by subjecting said support matrix seeded with chondrocytes to the treatment regimen comprising subjecting said support matrix seeded with chondrocytes to a perfusion with a perfusion medium at a flow rate from about 1 to about 500 μL per minute under a cyclic or constant hydrostatic pressure from about 0.01 MPa to about 10 MPa above atmospheric pressure, at frequency of about 0.01 to about 1 Hz, wherein said hydrostatic pressure is applied from about 1 hour to about 30 days and is followed by a resting period from about 1 day to about 60 days; and

wherein, following the treatment regimen, a ratio of the newly

synthesized extracellular matrix to a number of chondrocytes in the neo-cartilage construct is lower than 95:5%.

44. (New) The construct of claim 43 wherein said isolation of chondrocytes from the cartilage comprises enzymatic digestion of the cartilage with collagenase or lyase, each alone or in admixture.

45. (New) The construct of claim 43, wherein said isolated inactive non-dividing chondrocytes are further expanded by incubation in a culture medium.

46. (New) The construct of claim 45 wherein said chondrocytes are autologous.

47. (New) The construct of claim 45 wherein said chondrocytes are heterologous.

48. (New) The construct of claim 45 wherein said isolated and expanded chondrocytes are suspended in a collagen gel, collagen sol-gel, thermo-reversible gelation hydrogel or a thermo-reversible polymer gel.

49. (New) The construct of claim 48 wherein said collagen gel is Type I collagen solution.

50. (New) The construct of claim 49 wherein said Type I collagen is a purified pepsin-solubilized bovine collagen dissolved in a hydrochloric acid.

51. (New) The construct of claim 43 wherein said support matrix is a sponge, a honeycomb, a sol-gel, or a thermo-reversible gelation hydrogel (TRGH).

52. (New) The construct of claim 51 wherein said support matrix is prepared from a material selected from the group consisting of

a Type I, Type II or Type IV collagen; a collagen containing glycosaminoglycan, agarose or hyaluronin; a collagen containing proteoglycan, glycoprotein, gelatin, fibronectin, laminin, bioactive peptide, growth factor or cytokine; a synthetic polymeric fiber made of a polylactic acid, polyglycolic acid, polyamino acid, polycaprolactone; a copolymer thereof, and a combination thereof.

53. (New) The construct of claim 51 wherein said support matrix is the sponge or honeycomb seeded with isolated and expanded chondrocytes suspended in the Type I collagen solution.

54. (New) The construct of claim 51 wherein said chondrocytes are suspended in the sol-gel or thermo-reversible gelation hydrogel, when such sol-gel or hydrogel are in the sol stage and wherein said sol-gel or thermo-reversible gelation hydrogel is thermally converted to a solid gel thereby forming the solid gel support matrix containing said chondrocytes seeded within.

55. (New) The construct of claim 43 wherein the hydrostatic pressure is the cyclic from about 0.05 MPa to about 3 MPa at frequency from about 0.1 to about 1 Hz.

56. (New) The construct of claim 55 wherein said cyclic or constant hydrostatic pressure is about 0.5 MPa at frequency from about 0.5 Hz.

57. (New) The construct of claim 43 wherein the metabolic activation of the chondrocytes is additionally performed under a reduced oxygen concentration of less than 20%.

58. (New) The construct of claim 43 wherein additionally the metabolic activation of chondrocytes is performed at about 5% concentration of carbon dioxide.

59. (New) The construct of claim 51 wherein the support matrix construct has pores from about 50 µm to about 500 µm.

60. (New) The construct of claim 59 wherein the support matrix construct has pores from about 100 µm to about 300 µm.

61. (New) The construct of claim 43 wherein said support matrix is perfused with a medium at a rate of a medium perfusion from about 5 µL/min to about 50 µL/min wherein said medium is additionally supplemented with insulin-transferring-sodium selenite.

62. (New) The construct of claim 61 wherein said support matrix is perfused at a rate of about 5 µL/min.